TRANSMITTAL OF APPEAL BRIEF

Docket No.
PIE-10102/29

In re Application of: Jack Hetherington

Application No.	Filing Date	Examiner	Group Art Unit
09/684,205-Conf. #2529	October 6, 2000	J. H. Nguyen	2673

Invention: MOVING DIELECTRIC CAPACITIVE SENSOR

TO THE COMMISSIONER OF PATENTS:

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Dated: May 29, 2007

John G. Posa
Attorney Reg. No. : 37,424
GIFFORD, KRASS, SPRINKLE, ANDERSON & CITKOWSKI, P.C.
2701 Troy Center Drive, Suite 330
Post Office Box 7021
Troy, Michigan 48007-7021
(734) 913-9300

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of: Hetherington

Serial No.: 09/684,205 Group No.: 2673

Filed: October 6, 2000 Examiner: J. H. Nguyen

For: MOVING DIELECTRIC CAPACITIVE SENSOR

APPELLANT'S APPEAL BRIEF UNDER 37 CFR §41.37

Mail Stop Appeal Brief
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I. Real Party in Interest

The real party of interest in this case is P.I. Engineering, Inc., by assignment.

II. Related Appeals and Interferences

There are no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

The present application was filed with 17 claims. Claims 18-26 were added by amendment in January 2003. Claims 27-36 were added by amendment in December 2006. Claims 4, 5, 7-10, 13, 14, 17, and 23-26 have been canceled. Claims 20 and 29-35 have been withdrawn from consideration. Claims 1-3, 6, 11, 12, 15, 16, 18-22 and 27-36 are pending; however, claims 1-3, 6, 11, 12, 15, 16, 18, 19, 21, 22, 27, 28 and 36 are rejected and under appeal. Claims 1 and 11 are the rejected independent claims.

IV. Status of Amendments Filed Subsequent Final Rejection

A first after-final amendment has been filed and entered. A second after-final amendment is being submitted herewith addressing antecedent basis.

V. Summary of Claimed Subject Matter

Independent claim 1 is directed to a capacitive position sensor configured for interconnection to a utilization device (Figure 5). The apparatus includes a stationary signal-detecting capacitor plate 516, a stationary signal-transmitting capacitor plate 514 supported parallel to, and spaced apart from, the signal-detecting capacitor plate 516, the transmitting capacitor plate being divided into a plurality of electrically separated segments 518. A non-circular, movable dielectric element 510 is disposed between the signal detecting and signal-transmitting capacitor plates 516, 514. An elongate member 503 has a user-manipulable proximal end 502 and a distal end 504 coupled to the dielectric element 510, the member being operative to rotate and laterally shift the element in the x or y directions in a plane substantially parallel to the stationary plates as a function of user position. Circuitry (Figure 4) in electrical communication with the stationary plates is operative to (a) measure the capacitance between each segment of the signal-transmitting plate and the signal-detecting plate, (b) determine the position of the elongate member in the x and y directions as a function of the measured capacitance, and (c) determine rotation of the elongate member as a function of the measured capacitance, with or without lateral shifting of the dielectric element. An output for communicates the x-y position and rotation to a utilization device (Specification page 13, line 3 to page 16, line 12; Figure 5).

Independent claim 11 is directed to a capacitive-based joystick configured for interconnection to a utilization device. The apparatus comprises a housing 522 having a top surface; a stationary signal-detecting capacitor plate 516 disposed within the housing 522; a stationary signal-transmitting capacitor plate 514 disposed within the housing parallel to, and spaced apart from, the signal-detecting capacitor plate, the transmitting capacitor plate being divided into a plurality of electrically separated segments 518. A non-circular, movable dielectric element 510 is disposed within the housing between the signal-detecting and signal-transmitting capacitor plates 516, 514. A joystick

lever 503 is supported for pivotal movement having a proximal end 502 for user engagement and a distal end 504 loosely coupled to the dielectric element 510, enabling the lever to rotate and laterally shift the dielectric element in x and y directions in a plane substantially parallel to the stationary plates as a function of user position. Circuitry in electrical communication with the stationary plates is operative to (a) measure the capacitance between each segment of the signal-transmitting plate and the signal-detecting plate, (b) determine the position of the elongate member in the x and y directions as a function of the measured capacitance, and (c) determine rotation of the elongate member as a function of the measured capacitance, with or without lateral shifting of the dielectric element. An output for communicates the x-y position and rotation to a utilization device (Specification page 13, line 3 to page 16, line 12; Figure 5).

VI. Grounds of Objection/Rejection To Be Reviewed On Appeal

A. The rejection of claims 1-3, 6, 11, 12, 15, 16, 18, 19, 21, 22, 27, 28 and 36 under 35 U.S.C. §112, second paragraph.

B. The rejection of claims 1-3, 6, 18, 19, 21, 22, 27, 28 and 36 under 35 U.S.C. §112, first paragraph.

C. The rejection of claims 1-3, 6, 11, 12, 15, 16, 19, 21, 22 and 36 under 35 U.S.C. §103(a) as being unpatentable over WO 98/50759 to Dammeyer et al., and further in view of U.S. Patent No. 5,598,153 to Brasseur.

D. The rejection of claim 18 under 35 U.S.C. §103(a) as being unpatentable over WO 98/50759 to Dammeyer et al., and further in view of U.S. Patent No. 5,598,153 to Brasseur.

VII. Argument

A. <u>The rejection of claims 1-3, 6, 11, 12, 15, 16, 18, 19, 21, 22, 27, 28 and 36 under 35 U.S.C. §112, second paragraph.</u>

First, with regard to claim 11, "the elongate member" has been changed to "joystick lever," thereby overcoming the objection on the basis of insufficient antecedent basis.

With regard to the Examiner's objection to lines 9-11 of claim 1, specifically, that "it is not clear that 'rotation' in the last line is referred to a rotation of the dielectric element or the elongate

member," it is clearly evident from the claim that both the elongate member and the dielectric element are rotated. The lines in question read as follows: "an elongate member having a user-manipulable proximal end and distal end coupled to the dielectric element, the member being operative to rotate and laterally shift the element in the x or y directions in a plane substantially parallel to the stationary plates as function of user position." There seems to be no ambiguity that the user can either rotate or laterally shift the elongate member which, in turn, rotates or laterally shifts the moving dielectric in order to change capacitance and provide for control of a utilization device.

B. The rejection of claims 1-3, 6, 11, 12, 15, 16, 18, 19, 21, 22, 27, 28 and 36 under 35 U.S.C. §112, first paragraph.

The Examiner further argues that claim 1 is not enabled on the grounds that "the disclosure, when filed, does not fairly convey to one of ordinary skill in the art that Applicants had in their possession the claimed limitation of "an output for communicating rotation to the utilization device." This rejection is misguided. Appellant's apparatus resides in a *control device*. Figure 5A illustrates the applicability of the invention to a joystick, including a z-axis control capability. (Specification, page 13, lines 3 and 4). In this embodiment, "z-axis" refers to the rotational control in addition to x-y displacements. To one of skill in the art, Appellant's apparatus would not measure a degree of freedom if it were not used to control a utilization device. This is evident not only from the specification, but from the claims, including those as originally filed.

As to claim 27, the Examiner argues that the disclosure, when filed, does not convey to one of ordinary skill in the art that Applicants had in their possession the claim limitation of "the dielectric element having a periphery described by $r(\theta) = r_0 + a_2\cos(2\theta) + a_3\cos(3\theta)$. The Examiner argues that the disclosure, specifically the specification at page 13, lines 18-20, teach only that the "perimeter of the dielectric is approximate the $\rho(\theta) = r_0 + x\cos(\theta) + y\sin(\theta) + a_2\cos(2(\theta + \phi)) + a_3\cos(3(\theta + \phi))$. However, the second, more complicated formula referenced by the Examiner relates to the perimeter of the dielectric "when displaced from the center and rotated." (Specification, page 13, line 18). Thus, the formula used by Appellant in claims 27 and 28 do indeed, describe the periphery, in a neutral position without translation or rotation, as clearly shown in Figure 7 of the specification as originally filed.

C. The rejection of claims 1-3, 6, 11, 12, 15, 16, 19, 21, 22, 27, 28 and 36 under 35 U.S.C. §103, over Dammeyer, in view of Brasseur.

By way of a succinct review, Appellant's invention utilizes a non-circular, movable dielectric enabling a user to control a utilization device in x and y dimensions, as well as z-axis control through rotation of the elongate member or joystick lever. In the preferred embodiment, the shape shown in Figure 7 of Appellant's specification is used for this purpose, though other non-circular dielectric shapes are possible, *albeit* with more complicated mathematical transformations.

Dammeyer uses a circular dielectric in all described embodiments. The Examiner's argument on page 6 of the final Office Action that Dammeyer is "operative to rotate and laterally shift the dielectric element (30) . . . as a function of user position" is incorrect. First, it is clear from the Dammeyer reference that the position sensing device measures only x/y displacement, and not rotation. All of the figures of Dammeyer show a segmented capacitor plate symmetrical about a central axis. Reference is made to Figure 4, for example, which shows the moving dielectric (30) in an axially neutral position, covering plates P1, P2, P3 and P4. Clearly, if a user rotated the plate 30, nothing would happen, since the capacities would not change. Accordingly, Dammeyer is incapable of performing the way in which the Examiner argues.

The Examiner's argument that "Dammeyer further teaches that the dielectric element (30) can have other shapes," referring to page 1, lines 9-10 of the Dammeyer reference, does not mean that the system would be capable of measuring rotation without translation, or communicating the same to a utilization device. This simply means that the Dammeyer apparatus could measure x/y displacement *without rotation* using shapes other than "a disc." Indeed, referring to Figure 1 of Dammeyer, in conjunction with the way in which operation of the device is explained, it would be apparent to a person skilled in the art that post 15 rotates freely in hole 50. If it did not, x/y movement of the control handle or joystick 10 would be impossible, defeating the purpose of the Dammeyer apparatus. Thus, Dammeyer does not disclose all of the limitations of Appellant's claims with the exception of "a shape of non-circular," as to justify the Examiner at the top of page 7 of the Office Action.

To address the lack of a non-circular dielectric, the Examiner proposes the combination of Dammeyer and Brasseur. The latter resides in a device for the measurement of a rotor angle,

including a capacitive angular displacement transducer generating an output that varies with an angular displacement of a shaft. In other words, while the apparatus of Dammeyer is strictly limited to x/y displacement, the apparatus of Brasseur et al. is strictly limited to rotation. The first stator precludes a plurality of transmitting electrodes, a second stater, parallel and coaxial to the first stater, includes a conductive ring, and a rotor is located coaxially with the two plates, facilitating movement about axis 4, and *only* about this axis.

The Examiner argues that it would have been obvious to a person of skill in the art "to change the shape of the Dammeyer dielectric member to a non-circular shape, in view of the teachings in the Brasseur reference, because this would improve an [sic] accuracy of measured capacitance and the position of the dielectric element, as taught by Brasseur," (Column 2, lines 45-52). However, the Examiner is misinterpreting the Brasseur reference. Column 2, lines 45-52 states that an object of the Brasseur invention is to construct an *angular displacement transducer* which eliminates the disadvantages of known *angular displacement transducers* . . . thus, to the extent the Brasseur apparatus solves such a problem, it is clear from the reference that such improvements are applicable only to angular displacement transducers, and not to the Dammeyer system. There is no evidence whatsoever that the shapes taught by Brasseur would "improve the accuracy" of the Dammeyer position sensing system and, indeed, given that there is no disclosure in Dammeyer whatsoever that the control handle or joystick 10 is capable of rotating the disc 30, there is no reasonable expectation of success. Accordingly, *prima facie* obviousness has not been established.

D. The Rejection of Claim 18

Claim 18 adds to claim 11 that the dielectric element is "oval or egg-shaped." While this claim also stands rejected under 35 U.S.C. §103(a) over Dammeyer et al. in view of Brasseur, the Examiner concedes that neither teaches or suggests a moving dielectric that is "oval or egg-shaped." Rather, the Examiner's argument is that one of skill in the art would have found it obvious to shape the dielectric element of Dammeyer "as desired" as was judicially recognized in In re Dailey. However, in Dailey, the court stated that "[a]ppellants have presented no argument which convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious" (357 F.2d at 672-

73, 149 USPQ at 50).

In contrast, Appellant's specification establishes *at length* from page 13, line 15 to page 16, line 12 that to measure translation and rotation may lead, mathematically, to the shape shown in Figure 7, which is "oval or egg-shaped." Thus, the shape set forth in claim 18 is significant in that it solves a stated problem. Under these circumstances and given the foregoing deficiencies in the Examiner's prior art evidence, the shape of the moving dielectric in claim 18 cannot be baldly dismissed as an obvious matter of design choice. Compare In re Kuhle,526 F.2d 553, 555, 188 USPQ 7, 9 (CCPA 1975).

Conclusion

In conclusion, for the arguments of record and the reasons set forth above, all pending claims of the subject application continue to be in condition for allowance and Appellant seeks the Board's concurrence at this time.

Respectfully submitted,

By: _____

Date: May 29, 2007

John G. Posa
Reg. No. 37,424
Gifford, Krass, Sprinkle, Anderson & Citkowski, P.C.
PO Box 7021
Troy, MI 48007-7021
(734) 913-9300

APPENDIX A

CLAIMS ON APPEAL

1. A capacitive position sensor configured for interconnection to a utilization device, comprising:

a stationary signal-detecting capacitor plate;

a stationary signal-transmitting capacitor plate supported parallel to, and spaced apart from, the signal-detecting capacitor plate, the transmitting capacitor plate being divided into a plurality of electrically separated segments;

a non-circular, movable dielectric element disposed between the signal detecting and signal-transmitting capacitor plates;

an elongate member having a user-manipulable proximal end and a distal end coupled to the dielectric element, the member being operative to rotate and laterally shift the element in the x or y directions in a plane substantially parallel to the stationary plates as a function of user position;

circuitry in electrical communication with the stationary plates, the circuitry being operative to (a) measure the capacitance between each segment of the signal-transmitting plate and the signal-detecting plate, (b) determine the position of the elongate member in the x and y directions as a function of the measured capacitance, and (c) determine rotation of the elongate member as a function of the measured capacitance, with or without lateral shifting of the dielectric element; and

an output for communicating the x-y position and rotation to the utilization device.

2. The position sensor according to claim 1, wherein the utilization device is a computer.

3. The position sensor according to claim 1, wherein the elongate member is a user-graspable joystick.

6. The position sensor according to claim 1, wherein the segments of the signal-transmitting plate are arcuate.

11. A capacitive-based joystick configured for interconnection to a utilization device, comprising:

a housing having a top surface;

a stationary signal-detecting capacitor plate disposed within the housing;

a stationary signal-transmitting capacitor plate disposed within the housing parallel to, and spaced apart from, the signal-detecting capacitor plate, the transmitting capacitor plate being divided into a plurality of electrically separated segments;

a non-circular, movable dielectric element disposed within the housing between the signal-detecting and signal-transmitting capacitor plates;

a joystick lever supported for pivotal movement having a proximal end for user engagement and a distal end loosely coupled to the dielectric element, enabling the lever to rotate and laterally shift the dielectric element in x and y directions in a plane substantially parallel to the stationary plates as a function of user position;

circuitry in electrical communication with the stationary plates, the circuitry being operative to (a) measure the capacitance between each segment of the signal-transmitting plate and the signal-detecting plate, (b) determine the position of the elongate member in the x and y directions as a function of the measured capacitance, and (c) determine rotation of the elongate member as a function of the measured capacitance, with or without lateral shifting of the dielectric element; and

an output for communicating the user position to the utilization device.

12. The joystick according to claim 11, wherein the utilization device is a computer.

15. The joystick according to claim 11, wherein the segments of the signal-transmitting plate are arcuate.

16. The joystick according to claim 11, wherein the plurality of electrically separated segment includes 3 or 4 arcuate segments.

18. The position sensor according to claim 1, wherein the dielectric element is oval or egg-shaped.

19. The position sensor according to claim 1, wherein the plurality of electrically separated segment includes 3 or 4 arcuate segments.

21. The position sensor according to claim 1, wherein:

the elongate member includes a pivoting coupling between the first and second ends of the elongate member; and

the distal end of the elongate member is loosely coupled to the dielectric element so that the dielectric element remains in a plane substantially parallel to the stationary plates as the dielectric element is rotated or laterally shifted.

22. The position sensor according to claim 1, wherein:

the movement of dielectric element is constrained by the spacing of stationary plates so that the dielectric element remains in a plane substantially parallel to the stationary plates as the dielectric element is rotated or laterally shifted.

27. The capacitive position sensor according to claim 1, wherein the dielectric element has a periphery described by:

$$r(\theta) = r_0 + a_2\cos(2\theta) + a_3\cos(3\theta).$$

28. The joystick according to claim 11, wherein the dielectric element has a periphery described by:

$$r(\theta) = r_0 + a_2\cos(2\theta) + a_3\cos(3\theta).$$

36. The position sensor according to claim 1, wherein the segments of the signal-transmitting plate are arcuate.

APPENDIX B

EVIDENCE

None.

APPENDIX C

RELATED PROCEEDINGS

None.